DOCUMENT RESUME

ED 113 403 95 UD 015 496

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TITLE The Prevention of Learning Disability through Deficit Centered Classroom Training.
INSTITUTION Columbia Univ., New York, N.Y. Teachers College.; Scarsdale Board of Education, N.Y.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Div. of Handicapped Children and Youth.
PUB DATE 30 Mar 67
NOTE 19p.; Paper presented at the Annual International Convention of the Council for Exceptional Children (45th, March 30, 1967)

EDRS PRICE MF-$0.76 HC-$1.58 Plus Postage
DESCRIPTORS Academically Handicapped; *Curriculum Development; Developmental Programs; Developmental Tasks; *Diagnostic Teaching; Educational Diagnosis; Educational Therapy; *Handicapped Children; Human Development; Language Handicapped; *Learning Difficulties; Maturation; *Measurement Techniques; Motor Development; Special Education; Teaching Procedures

ABSTRACT

This document describes the development of an instrument to identify and diagnose developmental deficits at age 5 and the planning of a deficit centered training curriculum to prevent learning disabilities. An evaluation of the effectiveness of this curriculum, based on measures of the children's developmental growth and their academic achievement before and after the intervention program, indicates changes in intelligence, bodily schema, perceptual function, language development, and academic achievement for experimental and control groups following their first grade experience. Since the academic results are considered to be meaningless at this time, a followup study at the end of the children's second year of schooling will be made to ascertain differences based on both groups' exposure to the same reading program. Although the developmental gains are stated to be impressive, the degree to which the experimental children are able to compete in school is held to be the determinant of the program's ultimate success. Further investigations of the effect of special grouping, smaller class size,and the curriculum as they relate to this study are urged. (Author/AM)

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ED113405

The Prevention of Learning Disability Through Deficit Centered Classroom Training

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Paper to be presented at the 45th Annual International Convention of the Council for Exceptional Children

March 30, 1967

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UD 015496

*This project was sponsored by Teachers College, Columbia University and the Scarsdale Public Schools and supported with funds from the U.S. Office of Education, Division of Handicapped Children and Youth.

The experimental project developed in Scarsdale last year and supported by the U. S. Office of Education, Division of Handicapped Children and Youth, was a result of two years of explorations in new procedures to stimulate the growth of developmental sequences in kindergarten and first grade children. A survey had revealed that 15 to 20% of Scarsdale youngsters with average intelligence were functioning below the national mean in language, reading and arithmetic achievement tests at the completion of the primary grades and 18% scored below the national median in reading at the sixth grade level as compared to only 5% below in ability. A review of the records of these children revealed that in the overwhelming number of cases, the problems were identified by the kindergarten teacher and the children were described as having the following characteristics: poor concentration, short attention span, lack of fluency in oral communication, poor coordination, directional confusion, poor memory and/or poor visual-motor, spatial and temporal organization.

This project had three major goals:

1) the development of an effective instrument to identify and diagnose developmental problems at age 5

2) the devlopment of a "deficit centered training" curriculum

3) the evaluation of the effectiveness of this curriculum by measuring the child's developmental growth and their academic achievement before and after the intervention program.

Criteria for Selection

An instrument was developed to measure the children's developmental patterns in three major areas; bodily schema, preceptual-motor skills and language development. This instrument, the Sapir Developmental Scale, was administered individually to the total kindergarten population of 54 children taking approximately 20 minutes per child. The instrument was tested for reliability and validity and yielded a .92 correlation on a two week test-retest study and .84 with a nine month interval (Sapir,1966). Validity studies show a .66 correlation with the New York State Readiness Test and .64 correlation with the Stanford Achievement scores at the end of the first grade (Sapir,1967).

Eighteen (18) children were judged to be developmentally deficit with norms set at the 70th percentile. These 18 children scored below 61 on the scale (range 0-95) and revealed deficits in at least two of the three areas. The range cf scores was 39-84.

A neurological evaluation of the sampling of this population was performed one year after the administration of the Developmental Scale. Its purpose was to determine whether there was agreement in the classification of children with development deficits. Sixteen of the 18 "deficit" children were seen. Thirteen (13) children were diagnosed by Dr. Arnold Gold, Assistant Professor of Pediatric Neurology of the College of Physicians and Surgeons as having "minimal cerebral dysfunction." These thirteen (13) children were among the 18 children which the scale designated "deficit." None of the normal children were so rated by the neurologist. There was 81.25% correlation between Dr. Gold's diagnosis and the findings of the Developmental Scale. The Sapir Developmental Scale was able to differentiate these children at better than the .001 level of confidence.

Method

The eighteen (18) children meeting the criteria for selection were then placed in one of two groups. The experimental and control groups were matched as closely as possible by score on the screening instrument, chronological age and sex. For each two children in the experimental group, one was placed in the control group, a ratio of 12.6. The twelve (12) children in the experimental group were placed in one self contained classroom and the 6 children in the control group were combined with twelve (12) "normal" children to make a second class.

Curriculum in Experimental Group

In developing a curriculum for this project, certain assumptions were made. Because deficit children do not constitute a homogeneous group in the nature or extent of their deficits, it was deemed important not only to train specific sensory modalities but to help these children to integrate the modalities with each other and with cognitive function. These children were alike in that they all had difficulty in organizing their environment and a great deal of training was done in this area.

Deficits were pinpointed by psychological testing and then interpreted to the teacher for work with the children according to their individual needs using a variety of techniques.

Perception was seen as an active function. While an elimination of sensory stimulation is recommended by many, this investigator feels that such isolation does not teach the organism to differentiate. When one isolates the organism for sensory stimulation, one does not educate but simply protests. It is the position of this investigation that stimulation is essential but must be organized to act as a clue to learning. Children in order to learn need to be taught an effective way to organize, categorize and integrate these sensory stimuli so that they become symbolized and readily available. Visual, auditory, tactile and kinaesthetic clues must be organized and made available to the children so that they can match what they see, hear, feel, etc., making perceptions predictive.

Structure then becomes the key word in all curriculum planning. Emphasis is placed on slow and even pacing with much overlearning. Verbal mediation, a cognitive function, was seen as another important method of providing clues for solution and was helpful in the integration of all perceptual functions.

Planned properly, the classroom atmosphere itself can be just the setting to help the child orient himself, distinguish figure from ground, assimilate and integrate the simultaneous and sequential sensory input. Therefore, the organization of the classroom itself was seen as an integral part of the curriculum.

These investigators believe that training in the development of language not only consists of speaking, reading and writing, but also the organization of thought processes through the proper use of categorizations.

It was felt that reading instruction need not be delayed while such specialized multifaceted training takes place. Making an educated guess, it was felt that proper reading instruction could probably be used as part of the total curriculum to stimulate perceptual and integrative functioning. Reading for children with deficits should proceed in the same way as the development of the articulatory aspect of speech; from element to wholes. Children with deficits should be made aware of the discrete difference within words, how they relate to sounds and to meaning. The program begins with the analysis

of the spoken word and prceeds step by step to give the child insight into the structure of the written word, the sentence, the paragraph and the story.

The program consists of teaching each letter by name and sound in an organized manner, coded by number of spaces and direction of writing. Once taught, the letter or number becomes a visual clue as it is placed in a special order and sequence on display in the room. The child is then able to refer to the letter when working independently. Experience with visual, auditory, kinaesthetic and tactile modalities were used to teach the letters. For these children, each letter should be associated to meaningful content (a to apple, b to boy, etc.).

Evaluation

Testing in the fall and spring of the first grade covered the following areas: intelligence, bodily schema, perceptual-motor, language and academic achievement. The data from each of the pretest and posttest measures were analyzed.

Intelligence

The intellectual function was measured by the Wechsler Intelligence Scale for Children. The experimental group gained a mean of 10 points on the WISC by the end of the first grade, whereas the control group gained 2.333 points showing significant differences at better than the 5% level of confidence.

See Table 1

Bodily Schema

This function was measured by the Harris Test of Lateral Dominance, Draw-A-Person Test and the Hawthorne Concepts Scale. With the exception of the Harris Test of Lateral Dominance and two of the ten subtests of the Hawthorne, Time and Directionality (essentially information subtests), the difference of mean change favored the experimental group, showing significant gains in the total Hawthorne score in the experimental group (t=3.556, p.01).

See Table 2

Perceptual-Motor Function

This function was measured by the Frostig Test of Visual Perception, Science Research Associates Primary Mental Ability Perceptual Subtest, the Bender-Bestalt Visual-Motor Test and the Birch Test of Auditory-Visual Integration.

Mean change from fall to spring in all the perceptual-motor test tasks were significant at the 1% level of confidence in the experimental group. The experimental group showed a gain of 19.416 points in the Frostig Tests of Visual Perception as compared to a gain of 5.333 in the control group. The Perceptual Subtest of the SRA revealed a gain of 19.916 in the experimental grcup as compared with 9.833 in the control.

The Auditory-Visual Integration Test showed a gain of 2.250 (score 0-10) in the experimental group as compared to .333 in the control. Eight children of the 12 in the experimental group achieved auditory-visual integration above the norm of 6 as compared with two of the six in the control group.

See Table 3

The Bender-Gestalt with Koppitz scoring (error score 0-25) showed a gain with 6.383 less errors as compared to 4.166 in the control. In the Bender-Gestalt Motor Test, both groups of deficit children at mean age 6/6 tested markedly below normal. Their protocols were scattered, diffuse and disorganized. The spring testing revealed a difference of mean change (2.4) favoring the experimental group with a marked decrease in problems of articulation, rotation and distortion. Only three children of the 12 in the experimental group were below age level in the spring and these three came up to the six-year level, while only one child of the six control children reached that level. From an organizational standpoint, the experimental children's records became more carefully planned, better spaced and more discrete than the control children's.

See Table 4

Academic Performance

The results are unclear. Since both groups were taught with different methods learning different sets of words, two tests were used: the Stanford Achievement Tests

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See Table 5

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and Structural Reading Tests, still in their experimental stage. As one would expect, each group did better on the materials they had been taught, with the control group performing better in Paragraph Meaning in the Stanford and the experimental group performing better in Paragraph Meaning in the Structural Reading Tests. This makes sense since each used a different vocabulary.

There were no significant differences between the groups on the Stanford except in spelling which favored the control group at the 5% level of confidence. This was not surprising since the spelling words were those taught to the children in the control group but not in the experimental one.

It is felt that the academic results are meaningless at this time and only after another year, during which time both groups will be exposed to the same reading program, could differences be ascertained. A follow-up study will be done at the end of the children's second year of schooling.

Although the developmental gains seem impressive after one year of special programming, the degree to which the experimental children are able to compete in school will determine the ultimate success of the program.

It is also felt that a larger study will be necessary to see if the results can be duplicated with an attempt to isolate some of the variables. If the final results prove successful, it will be necessary to determine whether they were due to the special gouping, the smaller class size or the curriculum.

Abstract

The development of an effective instrument to identify and diagnose developmental deficits at age five and the planning of a deficit centered training curriculum to prevent learning disabilty is described. The effects of the intervention program are presented with changes in intelligence, bodily schema, perceptual function, language development and academic achievement for the experimental and control groups following their first grade experiences.

TABLE I

Differences in Mean Change in Intelligence Between Experimental and Control Groups with "Deficit" Children

Test	Experimental Group N-12 Mean Change	S.D.	Control Group N-6 Mean Change	S.D.	t	P
WISC Total	+10.000	7.122	+2.333	7.941	+2.075*	.05
Verbal	+9.250	9.294	+1.833	7.026	+1.714*	
Performance	+9.000	6.619	+3.666	12.675	+1.190*	
Information	+1.750	2.179	+2.000	1.673	- .245	
Comprehension	+1.833	2.587	- .333	1.366	+1.902*	
Arithmetic	+ .666	2.806	- .333	2.338	+ .749*	
Similarities	+2.083	2.998	+ .500	2.810	+1.076*	
Vocabulary	+1.083	2.020	- .833	1.940	+1.920*	
Picture Compl.	+ .583	2.151	- .666	2.065	+1.176*	
Picture Arrng.	+2.416	3.342	+ .500	2.880	+1.195*	
Block Design	- .166	3.379	- .666	1.366	+ .344*	
Object Assembly	+3.416	2.644	+1.500	4.370	+1.167*	
Coding	+ .916	2.539	+2.000	3.464	- .757	

*Favors experimental Group

Table 2

Differences in Mean Change Between Experimental and Control Groups With "Deficit" Children in Bodily Schema

Test	Experimental Group N-12 Mean Change	S.D.	Control Group N-6 Mean Change	S.D.	t	P
Harris Laterality	+ .166	.577	+1.333	1.366	-2.588	.05
Hawthorne Total	+8.583	8.360	+5.500	7.661	+ .756*	
Information	+1.250	2.667	+ .833	2.041	+ .334*	
Quantity and Dimension	+1.833	2.790	+1.000	2.449	+ .619	
Number	+1.166	3.270	-1.166	2.483	+1.531	
Directionality	+ .166	2.657	+1.666	1.032	-1.317	
Writing	+2.916	3.260	+2.500	3.619	+ .246*	
Laterality	+ .416	4.209	-1.333	4.226	+ .830*	
Time	+ .833	1.749	+2.000	1.095	-1.481	
DAPT	+5.750	10.163	+2.166	9.020	+ .729*	

*Favors experimental group

Table 3

Differences in Mean Change Between Experimental and Control Groups With "Deficit" Children in Perceptual-Motor Skills

Test	Experimental Group N-12 Mean Change	S.D.	Control Group N-6 Mean Change	S.D.	t	P
Bender-Gestalt	+ 6.583	3.476	+4.166	3.188	+1.426*	
Birch Auditory-Visual	+ 2.250	2.454	+ .333	3.011	+1.451*	
Frostig	+19.416	7.704	+5.333	12.307	+3.000*	.01
Eye-hand	+ 2.833	2.037	+1.166	2.714	+1.467*	
Figure Ground	+ 3.416	3.502	+1.166	1.940	+1.451*	
Form Constancy	+ 2.416	3.941	- .500	4.037	+1.468*	
Position in space	+ 1.916	2.065	+2.000	3.405	- .065	
Spatial relationship	+ 1.500	1.167	- .166	.983	+2.993	.01
S.R.A. Mental Ability Perceptual Subtest	+19.916	14.374	+9.833	22.355	+1.167*	

*Favors experimental group

Table 4

Differences in Mean Change between Experimental and Control Groups With "Deficit" Children in Langaage Development

Test	Experimental Group N-12 Mean Change	S.D.	Control Group N-6 Mean Change	S.D.	t	P
ITPA Total	1.447	.945	-.050	.900	3.213	.01
Visual Decoding	- .095	.565	-.110	1.169	.037	
Motor Encoding	.653	.877	-.505	.906	2.612	.02
Auditory-Vocal Association	.952	.440	.005	.773	3.349	.01
Visual Motor Sequencing	.627	.819	.658	.722	-.077	
Vocal Encoding	1.108	.912	-.283	.930	3.031	.01
Auditory Vocal Sequencing	.741	.719	.416	.679	.919	
Visual Motor Association	.331	1.136	-.003	1.041	.604	

Table 5

Differences in Mean between Experimental and Control Groups with "Deficit" Children in Achievement Tests

Test	Experimental Group N-12		Control Group N-6		t	p
	Mean	S.D.	Mean	S.D.		
Stanford Achieve.	-140.583	-28.008	-145.166	-30.056	.319	
Word Meaning	20.000	- 4.472	- 20.000	- 5.019	0.000	
Para.Meaning	-13.500	- 4.776	- 19.666	- 8.041	2.058	
Vocabulary	- 22.083	- 3.752	- 19.000	- 3.346	1.698*	
Spelling	- 7.250	- 4.474	- 12.333	- 4.844	2.213	.05
Word Study	39.333	- 7.475	- 38.833	- 7.082	.135	
Arithmetic	- 38.416	-12.507	- 35.333	-12.011	.499	
Structural Reading Total	- 88.666	-10.508	- 91.500	- 7.063	.592	
Initial Sounds	- 24.750	- .621	- 24.666	- .816	.242*	
Final Sounds	- 18.833	- 2.081	- 17.666	- 2.338	1.077*	
Sight Words	- 19.750	- 2.800	- 21.666	.816	1.620	
Silent E	- 12.083	- 3.287	- 11.500	- 3.146	.359	
Blends	- 13.250	- 3.792	- 16.000	- 2.097	1.638	
Structural Reading Paragraphs	- 56.750	- 3.646	- 51.833	- 6.911	2.004*	

*Favors experimental group

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